

BRADEN MOUNTAIN SURFACE MINE

CAMPBELL AND SCOTT COUNTIES, TENNESSEE

1 PURPOSE AND NEED FOR ACTION

In November 1999, TVA approved a mining plan submitted by Gatliff Coal Company for mining TVA-owned coal in the Koppers Coal Reserve in Campbell and Scott Counties, Tennessee. Most of the land surface over the Koppers Coal Reserve, including the area of the approved mine, is within the Royal Blue Wildlife Management Area and owned by Tennessee Wildlife Resources Agency (TWRA). The mine, known as Braden Mountain Area No. 16, had a permitted area of 664.5 acres and would have used a variety of surface mining techniques. Gatliff had previously been issued the necessary approvals for the mining plan by the Office of Surface Mining Reclamation and Enforcement (OSM) and the Tennessee Department of Environment and Conservation. As part of its approval process, OSM completed an Environmental Assessment and Finding of No Significant Impact (OSM 1999). TVA cooperated with OSM in the preparation of this EA, conducted its own independent review of this EA, and adopted this EA and issued its own FONSI as part of its November 1999 approval (TVA 1999).

Shortly after the November 1999 approval and before the initiation of mining activities, Gatliff terminated its lease agreement with TVA because changed coal market conditions had made the proposed mining operation uneconomical. OSM placed Gatliff's mining permit in inactive status.

Recent changes in coal market conditions have made the formerly proposed mining operation more economically attractive. TVA therefore proposes to enter into a new lease agreement that would result in mining coal in the Braden Mountain area. This EA evaluates the environmental impacts of the lease agreement and resulting coal mining operation, and supplements the EA prepared by OSM and adopted by TVA in 1999. It also addresses issues that have arisen since 1999.

2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 The Proposed Action

TVA proposes to enter into a lease agreement with a coal mining company that would result in the mining of TVA-owned coal in the Braden Mountain area. The mining operations would be carried out as described in the mine plan previously submitted by Gatliff Coal Company (Gatliff Coal Company 1999). The mine would produce about 300,000 tons of coal per year over a 7.4 year period, for a total production of 2,232,817 tons. Major features of the mine are illustrated in Figure 1.

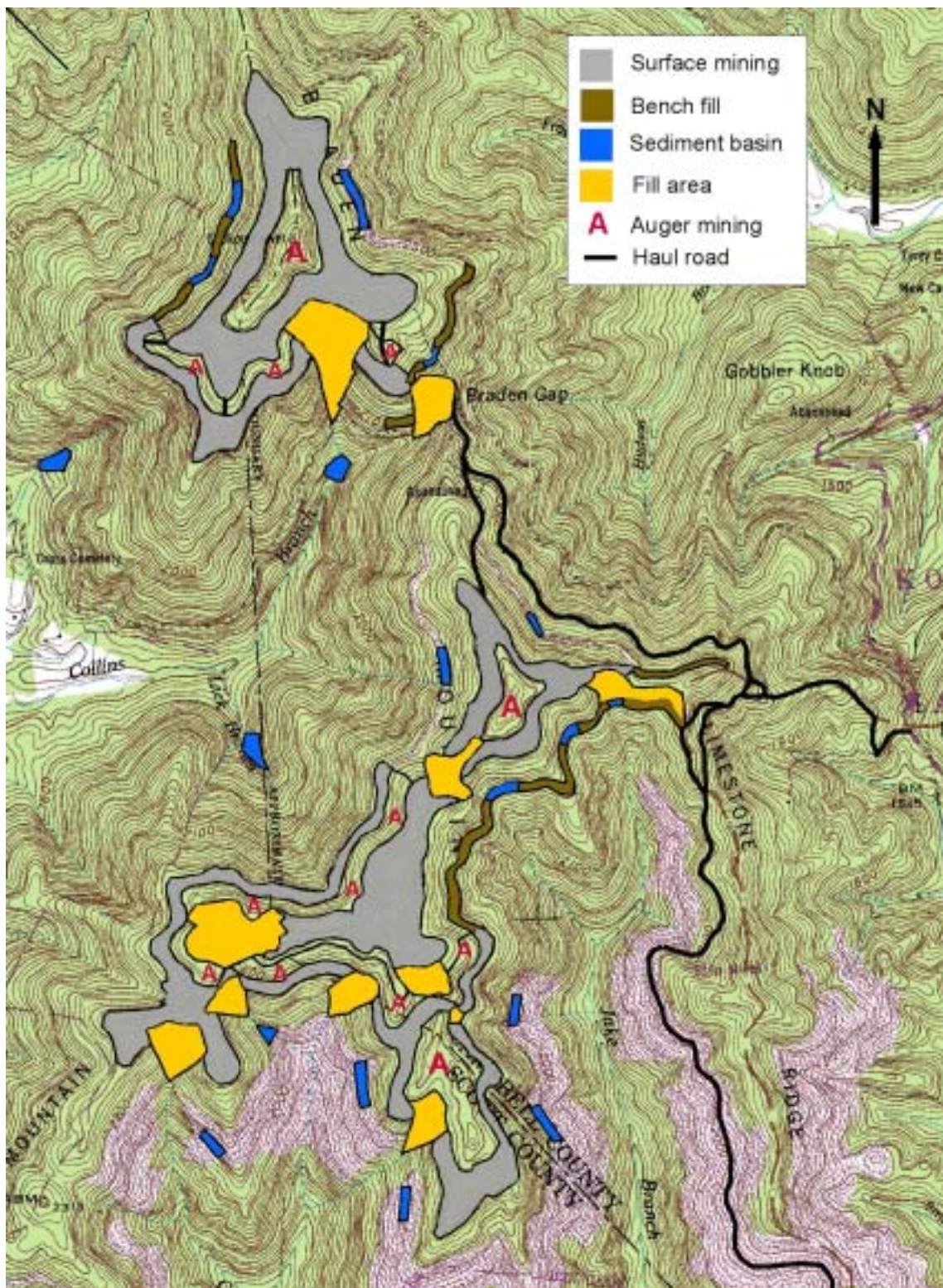


Figure 1. Major features of the proposed Braden Mountain surface mine.

As described in the Gatliff Coal Company mining plan, coal would be mined from five seams – Upper Pine Bald, Lower Pine Bald, Pewee, Walnut Mountain, and Red Ash. Mining techniques would include contour mining, cross ridge mining, second cut mining, and auger mining. The mine permit area, as defined by OSM regulations, is 664.5 acres. The area of surface disturbance, including roads, settling ponds, and fills, totals 526.5 acres. Haul roads would occupy about 86 acres, and light duty access roads to sediment basins would occupy 9 acres. Contour, cross ridge, and second cut mining would disturb an area of 320.6 acres. Auger mining would occur on 138 acres, on which there would be little surface disturbance.

Fill areas for excess overburden would total 90 acres. Four fill areas totalling 22.1 acres would be on old orphan mine benches, mostly on the 2300-foot contour. Six fill areas totalling 33.2 acres would be valley fills. The largest valley fill would be 9.8 acres, and portions of two of the valley fills would be on abandoned mine benches. The remaining four fill areas, totalling 34.7 acres, would be located within newly mined areas. Twenty-five sediment basins, ranging from 0.4 to 1.8 acres in size, would be constructed. Seven of these sediment basins would be within newly mined areas. The 18 other sediment ponds would have a total area of 18 acres; 14 of these 18 ponds would be on abandoned mine benches.

Almost all of the proposed roads outside of the area to be mined follow existing roads. Most of these roads would be regraded and many segments would be widened. About 0.6 miles of new road would be constructed between Elk Gap on Highway 297 and Braden Gap.

Hydrologic impacts would be minimized by measures described in a Hydrologic Reclamation Plan submitted as part of the Gatliff mine permit application. Haulroads would be constructed with durable material and culverts would be installed. Disturbed areas along roads would be quickly revegetated. All runoff from the actual mine site would be diverted by berms, drainage ditches, and natural drainways to sediment basins. Sediment ponds would be designed for a 10 year/24 hour precipitation event and have discharge structures to maintain a steady flow after precipitation events. Alternative sediment control devices, such as hay bales and filter fabric fence, would be utilized during early construction activities before basins are completed. Drainage structures would be lined with grass or rock as necessary, and incorporate splash ponds to control erosion. Storage of coal on the mine site would be minimized, and runoff from temporary coal stockpiles would drain to sediment basins. Fill areas would be constructed with diversion channels around their perimeters and rock drains beneath the fills to route both surface runoff and groundwater flow to sediment basins. Sediment basin discharges would be monitored and treated as necessary to meet effluent limitations.

Mine reclamation would be contemporaneous with mining. Backfilling of spoil would be used to eliminate highwalls and return the area to approximate original contour. Topsoil would be segregated during mining and redistributed over the area during reclamation. The postmining land use would be wildlife habitat. Revegetation measures to be implemented at the request of the TWRA and the U.S. Fish and Wildlife Service include planting warm season grasses on 20 acres of flat areas on top of the valley fills and planting 12.5 acres in hardwood species that would mature to provide potential bat roosting trees. Acceptable species include post oak, chestnut oak, persimmon, northern red oak, white oak and sawtooth oak; sawtooth oak would not compose more than 25 percent of the plantings. An additional 14 acres would be planted in a mix of trees and shrubs. Both the hardwood

plantings and the tree/shrub plantings would be in discrete blocks distributed across the mine area. The remainder of the area would be planted with a mixture of grasses and legumes. Sediment basins would be retained by TWRA for wildlife habitat enhancement; some basins may be modified to enhance their wetland characteristics.

2.2 Alternatives to the Proposed Action

Under the No Action alternative, TVA would not enter into a lease agreement for the mining of TVA-owned coal in the Braden Mountain area. The coal would not be mined as described above and TVA would not receive royalty payments.

3 AFFECTED ENVIRONMENT

3.1 Vegetation

The project area lies within the Cumberland Mountain subprovince of the Cumberland Plateau Physiographic Province as described by Fenneman (1938). It is also within the Mixed Mesophytic Forest Region as defined by Braun (1950). Historically, forests of this region were dominated by a mixture of deciduous trees including several oaks (northern red, white, black, scarlet, and chestnut oaks), red maple, sugar maple, yellow-poplar, basswood, cucumbertree, black cherry, yellow buckeye, sweet birch, blackgum, white ash, and, formerly, American chestnut. Pines occur on some south- and west-facing ridges and hemlock often occurs in stream bottoms.

The project area includes two peaks on Braden Mountain, with elevations of about 2640 and 2700 feet. The surrounding topography is steep and rugged. Most of the area has been previously disturbed by logging and/or coal mining. Deep mining has occurred in the area, although relatively little evidence of this disturbance remains. Abandoned contour surface mines surround much of Braden Mountain at about 2300 feet elevation. These mines are generally less than 100 yards wide and mostly reforested. Larger abandoned surface mines are present between about 1900 and 2150 feet elevation on the south side of Braden Mountain and between Braden Mountain and Highway 63. These mines are partially revegetated.

The dominant vegetation type is upland hardwood forest. Forests on Braden Mountain range from sapling to sawtimber-size. A large portion of the southern Braden Mountain site was logged in about 1999 to prepare for mining by Gatliff Coal Company. This area is vegetated by a mixture of hardwood saplings, pole-sized trees and scattered snags, and has a dense shrub layer dominated by blackberry and pokeweed. Forests on the ridgetops and south and west slopes are dominated by scarlet and chestnut oaks, mockernut hickory, red maple, and sourwood. Common understory species found in these forests include mountain laurel, flame azalea, pinxter flower, greenbriar, and Christmas fern. Forests on north and east slopes support more mesic species including yellow-poplar, yellow buckeye, white oak, northern red oak, sweet birch, cucumbertree, and basswood. These forests have a rich herbaceous understory; common species include black cohosh, wild ginger, and painted trillium. Dominant trees on the abandoned mines are black locust, yellow-poplar, and red maple; Virginia pine, shortleaf pine, and white pine are also present. Many of the pines have recently died from southern pine beetle infestation.

The distribution, estimated age class, and composition of the forest communities in the project area are representative of the greater Cumberland Mountain region (Smalley 1984; Hinkle et al. 1993). Review of all natural communities thus far defined in the International Classification of Ecological Communities indicates that none of the plant communities are currently considered to be imperiled (have been assigned a global conservation rank of G1 or G2; NatureServe 2002). In summary, no plant communities of state, regional, or global significance occur within the project area.

3.2 Wildlife

The primary wildlife habitat in the Braden Mountain area consists of upland hardwood forest. Previous mining and timber harvesting activities have resulted in an overall mixture of age classes of trees in most forested portions of the study area. Age classes range in age from mixed sapling and pole-sized stands to mature sawtimber-sized, second-growth forest. Mast producing trees such as hickories and a variety of oaks are common in the project area. Other prominent tree species in the area include yellow-poplar and red maple.

A portion of the area (described in Section 3.1) was logged in about 1999 in preparation for the mining proposed by Gatliff Coal Company. Roads, partially vegetated abandoned surface mines, and exposed rock highwalls provide additional early successional habitats. Prominent species of plants in these early successional habitats include princess tree, redbud, black locust, elderberry, and blackberry.

As part of the Royal Blue Wildlife Management Area (RBWMA), the study area is managed for wildlife such as white-tailed deer, wild turkey, gray squirrel, raccoon, quail and ruffed grouse. The Tennessee Wildlife Resources Agency (TWRA) has recently reintroduced elk and bear into RBWMA. Elk sign was observed in the Braden Mountain area during field investigations. Black bear are occasionally sighted in the lower elevations of RBWMA.

In addition to the game species listed above, other common mammals in the project area include gray fox, eastern chipmunk, woodland vole, white-footed mouse, house mouse, big brown bat, red bat, and short-tailed shrew. Reptiles and amphibians observed within the area include eastern box turtle, green frog, leopard frog, gray tree frog, five-lined skink, fence lizard, red-spotted newt, American toad, garter snake, and black rat snake. A few small ponds on abandoned mine benches provide habitat for several species of amphibians. Northern copperhead and timber rattlesnake were also observed during field visits.

A few abandoned mine portals occur within the Braden Mountain permit area. These cave-like environments can provide habitat for numerous species of small mammals, such as white-footed mice, and several species of bats. Birds such as eastern phoebe and Carolina wrens also frequently build nests in mine openings.

The permit area supports a diverse bird population, comprised mostly of forest-dwelling species. About half of the approximately 55 species of birds breeding in the mine permit area are neotropical migrants which winter in the Caribbean and Latin America. The most abundant species present in pole- to sawtimber-sized forest are, in descending order of abundance, the red-eyed vireo, ovenbird, cerulean warbler, scarlet tanager, American redstart, black-and-white warbler, and hooded warbler. Indigo buntings, eastern towhees, and northern cardinals are common in forest edges and in the portion of Braden Mountain

cutover 3 to 4 years ago. Other birds typical of early successional habitats occurring in the cutover area are the chestnut-sided warbler, yellow-breasted chat, American goldfinch, and field sparrow. Several birds more typical of later successional forest including the red-eyed vireo, black-and-white warbler, hooded warbler and Kentucky warbler also occur in the cutover area, especially around its perimeter.

3.3 Endangered and Threatened Species

3.3.1 Plants

Review of the TVA Natural Heritage and the Tennessee Division of Natural Heritage Program databases revealed that three federally listed and 37 additional state-listed plant species are known from Campbell and Scott Counties, Tennessee (Appendix 1). These species lists formed the basis of field surveys for rare plant species, which were conducted in June and August 2002.

No federal-listed plant species, or suitable habitats for such species, were observed during field surveys of the project area. However, a single individual of goldenseal (*Hydrastis canadensis*), state-listed as of special concern because of commercial exploitation, was found on the northern Braden Mountain area.

During the surveys conducted in June 2002, several areas of potentially suitable habitat for several state-listed species were observed. These areas were re-evaluated during follow-up surveys conducted in August 2002. The majority of available habitat is less than optimal for the rare plant species potentially occurring in the project area. No additional occurrences of rare plant species were observed during these follow-up surveys conducted in August 2002.

3.3.2 Terrestrial Animals

A review of the TVA Regional Natural Heritage Program database indicates that several species of amphibians, reptiles, birds, and mammals that potentially occur in the project area are protected under state and/or federal law. Table 1 lists these species and their individual legal status.

Four protected species of salamanders are reported from the vicinity of RBWMA. Eastern hellbenders are large aquatic salamanders that live in cool, well-oxygenated streams. The species has been reported from nearby Cove Lake and portions of Cove Creek. However, hellbenders are not expected in the project area due to heavy silt loads in associated streams. Black Mountain dusky salamanders are associated with permanent streams. Due to the semi-permanent nature of the small streams on the Braden Mountain area, suitable habitat for this species is limited in the project area.

The two remaining species of salamanders, four-toed, and Wehrle's, potentially exist in the project area. These salamanders are associated with the margins of small vernal ponds or moist bluff faces. Records of both species are reported from nearby areas. Former strip mining operations in the study area created several small depressions that temporarily collect water. Many of these depressions are suitable habitat for four-toed salamanders. The Wehrle's salamander has only been found in one locality in Tennessee; researchers are currently searching for the species in the RBWMA. Highwalls created during former mining activities and sandstone outcrops in the project site represent suitable habitat for this species.

Table 1. Endangered, threatened, or otherwise listed terrestrial animals known from Campbell and Scott Counties, Tennessee.

Common Name	Scientific Name	State Status	Federal Status
Amphibians			
Eastern Hellbender	<i>Cryptobranchus a. alleghaniensis</i>	In Need of Management	—
Black Mountain Dusky Salamander	<i>Desmognathus welteri</i>	In Need of Management	—
Four-toed Salamander	<i>Hemidactylium scutatum</i>	In Need of Management	—
Wehrle's Salamander	<i>Plethodon wehrlei</i>	In Need of Management	—
Birds			
Sharp-shinned Hawk	<i>Accipiter striatus</i>	In Need of Management	—
Cerulean Warbler	<i>Dendroica cerulea</i>	In Need of Management	—
Peregrine Falcon	<i>Falco peregrinus</i>	Endangered	—
Swainson's Warbler	<i>Limnothlypis swainsonii</i>	In Need of Management	Management Concern*
Red-cockaded Woodpecker	<i>Picoides borealis</i>	Endangered	Endangered
Bewick's Wren	<i>Thryomanes bewickii</i>	Endangered	—
Barn Owl	<i>Tyto alba</i>	In Need of Management	—
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	In Need of Management	Management Concern
Mammals			
Eastern Big-eared Bat	<i>Corynorhinus rafinesquii</i>	In Need of Management	—
Gray Bat	<i>Myotis grisescens</i>	Endangered	Endangered
Eastern Small-footed Bat	<i>Myotis leibii</i>	In Need of Management	—
Indiana Bat	<i>Myotis sodalis</i>	Endangered	Endangered
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	In Need of Management	—
Allegheny Woodrat	<i>Neotoma magister</i>	In Need of Management	—
Hairy-tailed Mole	<i>Parascalops breweri</i>	In Need of Management	—
Common Shrew	<i>Sorex cinereus</i>	In Need of Management	—
Smoky Shrew	<i>Sorex fumeus</i>	In Need of Management	—
Southeastern Shrew	<i>Sorex longirostris</i>	In Need of Management	—
Southern Bog Lemming	<i>Synaptomys cooperi</i>	In Need of Management	—

*Management Concern is a non-regulatory status indicating concern for the species.

Eight protected species of birds are reported from Campbell and Scott counties. Two, the red-cockaded woodpecker and the Bewick's wren, are considered extirpated from the area.

A colony of red-cockaded woodpeckers occurred in the eastern portion of RBWMA from at least the 1970s into the early 1980s. This species requires large areas of mature to old growth pines. No suitable habitat exists in the vicinity of Braden Mountain, and the woodpecker is now considered by TWRA to be extirpated from the State. There are two races of Bewick's wren in Tennessee. The Appalachian race formerly nested in Campbell County, however its numbers have dropped drastically. The Appalachian Bewick's wren no longer exists in much of east Tennessee. The Bewick's wren is reported from middle and west Tennessee, where it occurs in open woodlands, upland thickets and fencerows in agricultural areas (Nicholson 1997). This species has also recently declined in numbers. Neither subspecies of Bewick's wren is expected to occur in the project area.

Four state-listed species of birds potentially occur in the vicinity of the project area. Swainson's warblers are rare summer residents of RBWMA. The species is occasionally observed along Cove Creek. The Swainson's warbler is associated with extensive thickets of rhododendron or in thick vegetation along waterways. Limited suitable habitat exists in the project area. Peregrine falcons likely migrate through the project area. The species historically nested on cliffs in eastern Tennessee. The species likely nested within 18 miles of Braden Mountain in 1950s (Nicholson 1997). Exposed highwalls at Poteet Gap would provide marginal habitat for this species. Sharp-shinned hawks are uncommon in the area, but could be found in the project area year round. It is most numerous during the fall and spring, when the species migrates through the area. It typically nests in pines within mixed pine-hardwood forests, and forages in open forests and forest edges. Barn owls prefer to nest in semi-forested bluffs, hollow trees, and old buildings. Highwalls in the Poteet Gap area represent suitable nesting habitat for this species.

Two state-listed species of warblers, the golden-winged and the cerulean, nest in the project area. The golden-winged warbler is fairly common in the Royal Blue area and occupies old fields and revegetated surface mines with a ground cover of grasses and forbs, clumps of shrubs, and scattered trees. Potentially suitable habitat for this bird occurs on a reclaimed surface mine a short distance NNW of Poteet Gap; no golden-wings were observed in this area or elsewhere within the Braden Mountain mine permit area. The grass/forb ground cover on the recently logged southern portion of the Braden Mountain site is not extensive enough to provide habitat for the golden-winged warbler.

The cerulean warbler is a common summer resident of mesic hardwood forests in the Cumberland Mountains. It occupies mixed age to mature stands, usually with an open understory and scattered canopy gaps. It reaches some of its highest rangewide densities in the Cumberland Mountains (Nicholson 1997) and is one of the most numerous songbirds on RBWMA (Nicholson unpubl. data). Cerulean warblers have been reported on 8 bird census plots containing suitable forest habitat on or adjacent to RBWMA. Their density on these plots ranged from 5 to 51 pairs/100 acres (12 to 125 pairs/100 ha) and averaged 25.8 pairs/100 acres (64 pairs/100 ha) (censuses published in *Audubon Field Notes* and *American Birds*; Nicholson unpubl. data).

During May and June 2002, cerulean warblers were recorded at 26 of 43 point counts conducted in the Braden Mountain mine permit area. The proportion of counts recording cerulean warblers, 60%, is very similar to the proportion of a larger sample of point counts (220 of 357, 62%) censused in the portion of RBWMA west of I-75 in 1995-1997. Assuming that the proportion of point counts recording cerulean warblers is indicative of the proportion of the area occupied by cerulean warblers and the average density within occupied areas is

25.8 pairs/100 acres, about 104 pairs of cerulean warblers likely occur within the 665 acre Braden Mountain mine permit area.

Several protected species of bats are known from Campbell and Scott Counties. Eastern big-eared bats form colonies in hollow trees, crevices in sandstone bluffs, cisterns, and abandoned buildings. Eastern small-footed bats roost in abandoned mines, under rocks in talus slopes, in crevices in bluffs and expansion joints in bridges. Both species forage in forested habitats and usually hibernate in caves. Suitable roosting and foraging habitats for big-eared and small-footed bats are present in the Braden Mountain area.

The endangered gray bat is known from Campbell and Scott Counties. Gray bats occupy caves throughout the year. Summer roosts are usually formed in caves near water. Gray bats typically forage over larger streams, rivers, and reservoirs. During winter months, they migrate from their summer colonies to hibernate in cooler caves. Gray bats have been found hibernating in New Mammoth Cave, approximately 7 miles from Braden Mountain.

The endangered Indiana bat forms small roosts under the exfoliating bark of dead trees during summer months. Several species of trees that have flaky bark, such as white oak and shagbark hickory, are also used as roost sites. Roosts trees may be found in riparian or upland forests near streams. There are only a few small maternity colonies known from Tennessee. No colonies are known from the RBWMA, but forested areas in the project area are suitable for Indiana bats. Indiana bats hibernate in caves during winter months. Approximately 85% of the total Indiana bat population roosts in 7 caves north of Tennessee. The remainder of the population forms small colonies in caves throughout the species range, including several sites in Tennessee. A small colony hibernates in New Mammoth Cave.

Abandoned coal mine portals can provide potential hibernating sites for both the gray bat and the Indiana bat. One such site, on a northeast slope of the southern portion of the Braden Mountain site, was surveyed in January, 1999. The site was found to be too warm to be used as a gray bat or Indiana bat hibernaculum. Two other portals occur on abandoned mine benches at about 2300 foot elevation; one of these is on the northwest slope of the southern portion of the Braden Mountain site and the other is on the east slope of the northern portion of the Braden Mountain site. Due to the lack of open water resources and the lack of roosting caves, gray bats are not likely to roost or forage on the Braden Mountain site.

Several species of state-listed small mammals are reported from Campbell and Scott Counties. Smoky, common, and southeastern shrews have are typically found in cooler, moist forests with a thick-leaf litter layer and moss-covered rocks, fallen logs, and other woody debris. These small mammals are usually found in association with creeks, streams, or moist areas. Southeastern shrews are less constrained by habitat requirements than other shrews and can be found in a variety of habitats. Most habitats in the RBWMA are suitable for these species, especially smoky and southeastern shrews.

Allegheny woodrats are typically found along rock outcrops, in caves or mines, usually in forested areas having a high degree of woody debris and leaf litter. There are no records of woodrats from the project site, however, suitable habitat for this species exists along the many forested highwalls and rock outcrops on the Braden Mountain site.

Woodland jumping mice, hairy-tailed mole, and bog lemming exist in suitable habitats on the RBWMA. The species are usually associated with moist habitats. Jumping mice are found in forested or brushy areas along streams or the margins of wetland habitats. Hairy-tailed moles in the vicinity have been collected under decomposing logs in loose, moist soil (Allsbrooks et al. 1983). Bog lemmings have also been collected in similar habitats. These species are expected to exist in suitable habitats in the project area.

3.3.3 Aquatic Animals

Activities in the proposed mine permit area could affect several named perennial and intermittent streams that support aquatic life. A search of the TVA Regional Natural Heritage Project database indicates that several federally or state-listed species have been reported from Campbell and Scott Counties (Table 2). This section provides brief descriptions of the status of these species in the project area.

Table 2. Endangered, threatened, or otherwise listed aquatic animals reported from Campbell and Scott Counties, Tennessee.

Common Name	Scientific Name	State Status	Federal Status
Molluscs			
Cumberland elktoe	<i>Alasmodonta atropurpurea</i>	Endangered	Endangered
Cumberlandian combshell	<i>Epioblasma brevidens</i>	Endangered	Endangered
Tan riffleshell	<i>Epioblasma florentina walkeri</i>	Endangered	Endangered
Green blossom pearlymussel	<i>Epioblasma torulosa gubernaculum</i>	Endangered	Endangered
Littlewing pearlymussel	<i>Pegias fabula</i>	Endangered	Endangered
Cumberland bean	<i>Villosa trabalis</i>	Endangered	Endangered
Fish			
Emerald darter	<i>Etheostoma baileyi</i>	In Need of Management	-
Ashy darter	<i>Etheostoma cinereum</i>	Threatened	-
Arrow darter	<i>Etheostoma sagitta</i>	In Need of Management	-
Duskytail darter	<i>Etheostoma percnurum</i>	Endangered	Endangered
Cumberland johnny darter	<i>Etheostoma susanae</i>	Endangered	Candidate
Palezone shiner	<i>Notropis albizonatus</i>	Endangered	Endangered
Tippecanoe darter	<i>Etheostoma tippecanoe</i>	In Need of Management	-
Silverjaw Minnow	<i>Notropis buccatus</i>	Threatened	-
Rosyface Shiner	<i>Notropis rubellus rubellus</i>	In Need of Management	-
Blackside dace	<i>Phoxinus cumberlandensis</i>	Threatened	Threatened

The emerald darter, arrow darter, and blackside dace have all been recently reported in Terry Creek, a tributary to Elk Fork Creek, and in Straight Fork Creek and its Jake Branch tributary. The headwater portions of these streams drain portions of the proposed mine permit area. None of these species, or other listed aquatic species, have been reported

from streams within the proposed mine permit area, and none were found in field surveys of this area conducted during June 2002.

The emerald darter inhabits rocky pools and runs of the creeks and small rivers that make up the watersheds of the Big South Fork and Upper Cumberland Rivers (Etnier and Starnes 1993). On the Cumberland Plateau, this species is particularly susceptible to degradation of water quality resulting from siltation, toxic runoff, and acid mine drainage from coal mines and poor land use practices.

The arrow darter inhabits pools and runs in streams of slow-to-moderate current. High quality habitat includes have bedrock and rock rubble bottoms interspersed with areas of clean sand; such streams are usually cool and densely shaded by hemlock, rhododendron, or mountain laurel. The arrow darter is adapted to tolerate moderate levels of siltation; however, its range has probably been adversely impacted by heavy siltation following logging and surface mining and acid mine drainage from surface mines. The arrow darter's range in Tennessee is confined to the upper Cumberland River and some of the eastern tributaries to the Big South Fork on the Cumberland Plateau.

The blackside dace is found in about 30 separate streams in the upper Cumberland River system (primarily above Cumberland Falls) in Kentucky and Tennessee, including parts of Scott and Campbell Counties. It inhabits small upland streams with moderate flows and is generally associated with undercut banks and large rocks in relatively stable, well-vegetated watersheds with good riparian vegetation. The fish is not found in low-gradient silty streams or in high-gradient mountain tributaries. Habitat degradation from coal mining (acid mine drainage), natural low flows, and siltation from logging, road construction, agriculture, and human development are the primary threats to this species.

None of the remaining species listed in Table 2 have been recently reported in stream segments draining the proposed mine permit area. The only known locations in Scott or Campbell Counties for several of the species listed in Table 2 are within the main channel of the Big South Fork River. These species include the Cumberland elktoe, Cumberlandian combshell, tan riffleshell, littlewing pearlymussel, Cumberland bean, duskytail darter, and Tippecanoe darter. None of these species is likely to occur in streams potentially impacted by this action.

The green blossom pearlymussel formerly occurred in the Tennessee River system, including the Clinch River. It is considered likely to be extinct (NatureServe 2001). The palezone shiner formerly occurred in Cove Creek, but is now believed to be extirpated from Tennessee (Etnier and Starnes 1993). The only known extant populations of this species occur in the Little South Fork of the Cumberland River in southeast Kentucky and Paint Rock River in Alabama. Neither the green blossom pearlymussel nor the palezone shiner are likely to occur in streams within the project area.

The silverjaw minnow occurs in small creeks as well as large rivers with sand substrates. The last reported occurrence of this species in potentially affected streams was in Straight Creek in 1974. This species is considered on the verge of extirpation in the upper Cumberland drainage in Tennessee (Etnier and Starnes 1993).

The Cumberland johnny darter is known from short reaches of 16 small streams in the upper Cumberland system in Whitley and McCreary Counties in Kentucky, and two small streams in Tennessee: one in Scott County and one in Campbell County (O'Bara 1988,

Laudermilk and Cicerello 1998). It is not known from streams in the Straight Creek, Cove Creek, or Elk Fork drainages, and is not likely to occur in any streams potentially impacted by this project.

The ashy darter is known from several tributaries to the New River near the project area. It is typically found in small to medium upland rivers with bedrock or gravel substrate and sluggish currents (Etnier and Starnes 1993). It is also known from a few other tributaries to the Cumberland River as well as a few tributaries to the Tennessee River in Tennessee and Kentucky.

The rosyface shiner typically inhabits large creeks and small rivers with clean water and substrates consisting of rubble, boulder, or bedrock. Although this species is more tolerant of siltation than other related species, it is particularly susceptible to degradation of water quality resulting from siltation, toxic runoff, and acid mine drainage from coal mines and poor land use practices. The subspecies of rosyface shiner that occurs on the Cumberland Plateau (*Notropis rubellus rubellus*) is particularly threatened by habitat degradation.

3.4 Surface Water and Aquatic Ecology

The proposed mine area is located within the Cumberland Mountains subprovince of the Cumberland Plateau physiographic province. Larger streams in this subprovince tend to have moderate to low gradients and flow in well defined valleys. Examples include Elk Fork Creek, Buffalo Creek, and Cove Creek. Smaller streams drain mountain slopes and tend to have moderate to high gradients and a substrate of boulders, cobble, and gravel. Many streams in the Cumberland Mountains have been degraded by siltation and acid mine drainage from unreclaimed or poorly reclaimed coal mines. This situation has ameliorated somewhat in recent years. Otherwise, waters in the subprovince tend to be soft and low in dissolved nutrients.

The proposed mine site is located within the headwaters of three watersheds: Buffalo Creek, Elk Fork Creek, and Straight Fork. A portion of the haul roads within the proposed mine permit area are within the headwaters of a fourth watershed, Cove Creek. Buffalo Creek, through its Rockhouse Fork, Collins Branch, Lick Branch, and Crabtree Branch tributaries, drains the west side of the site. Buffalo Creek is a tributary to the New River. Elk Fork Creek, a tributary to Clear Fork Cumberland River, drains the northeast portion of the site via its Terry Creek, Stillhouse Branch, Frogpond Hollow, and Hudson Branch tributaries. Much of the southern portion of the site drains to Straight Fork as well as its Jake Branch and Cross Branch tributaries. Straight Fork is a tributary to Buffalo Creek.

Water use classifications of the streams draining the proposed mine permit area are fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. Cove Creek has the additional use classification of industrial and domestic water supply. There are no surface water users within or adjacent to the proposed mine permit area. The closest domestic groundwater resource is about a mile from the proposed mine site and much lower than potentially affected coal seams.

A 3.9 mile stretch of Elk Fork Creek near Jellico is listed on the state of Tennessee's 2002 draft Clean Water Act 303(d) list as partially supporting use classifications (TDEC 2002). The causes of these exceedances of water quality standards are siltation and other habitat alterations resulting from abandoned mining. Straight Fork Creek and its tributaries are also listed on the 303(d) list as partially supporting use classifications. The causes of these

exceedances of water quality standards are pH and other habitat alterations, resulting from resource extraction and habitat modification.

The portions of these streams within the mine permit area are intermittent or wet weather conveyances which are dry most of the year. Five of the eight intermittent streams were flowing or wet during June 2002. Evidence of aquatic life (caddisflies, mayflies, chironomids) was present during June 2002 in an intermittent tributary to Frogpond Hollow on the northeast slope of the northern portion of Braden Mountain, and in an intermittent tributary to Jake Branch on the east slope of the southern portion of Braden Mountain. The Frogpond Hollow tributary flows from several separate channels which converge on an orphan mine bench and the Jake Branch tributary flows from a pond on an orphan mine bench. A few ponds, some of which are ephemeral, occur on orphan (e.g., abandoned) mine benches within the mine permit area. These ponds are occupied by aquatic insects and several species of amphibians.

The aquatic community in Cove Creek at mile 18.2 (about one mile above Cove Lake) was sampled by TVA in May 2000. The fish assemblage, comprised of 15 species, was rated fair compared to what would be expected in such a stream under ideal conditions; the benthic assemblage (bottom-dwelling invertebrates) was rated good.

Results of surface water quality monitoring within potentially affected streams are presented in the 1999 mine permit application (Gatliff Coal Company 1999) and in Cumulative Hydrologic Impact Assessments prepared by OSM (OSM 1999). Water quality in these streams is described as reasonably good. Collins Branch, Rockhouse Fork, Cross Branch, and Jake Branch show impacts from past coal mining based on moderate to high concentrations of sulfate (up to 150 mg/l). pH levels in sampled streams are near-neutral (5.5 – 8.0). Total dissolved solids, dissolved iron, and dissolved manganese levels are below Environmental Protection Agency (EPA) standards except for the Straight Fork watershed, where both total dissolved solids and dissolved manganese standards are exceeded.

3.5 Managed Areas and Ecologically Significant Sites

The land surface of the Braden Mountain area is within the 43,620-acre Royal Blue Wildlife Management Area owned by the TWRA. TWRA purchased the area in 1991 after leasing it for many years from several previous owners. The WMA is managed for hunting and other forms of outdoor recreation including wildlife observation, off-road vehicle operation, hiking, and horse riding (TWRA 2001). Several habitat management projects have been undertaken in cooperation with organizations such as Quail Unlimited, the National Wild Turkey Federation and the State Division of Mine Reclamation.

Popular game species on RBWMA are white-tailed deer, wild turkey, ruffed grouse, raccoon, and squirrel. TWRA began releasing elk on RBWMA in 2000 as part of an elk restoration project centered on the Cumberland Mountains and adjacent parts of the Cumberland Plateau.

The Smoky Mountain segment of the Cumberland Trail, a linear state park, runs through RBWMA. At its closest point, the Cumberland Trail is about 7 miles from the proposed mine permit area.

RBWMA is also one of two publicly owned tracts within the Southern Cumberland Mountains Important Bird Area (IBA), which encompasses 141,000 acres in four counties (National Audubon Society 2002a). The Southern Cumberland Mountains IBA is notable for its high populations of the cerulean warbler and the golden-winged warbler, as well as the presence of many other species of migrant and resident birds. The IBA program is an international effort to identify the most important areas for maintaining bird populations and focus conservation efforts on those sites (National Audubon Society 2002b). It is administered in the U.S. by the National Audubon Society and in Tennessee is administered by TWRA in cooperation with the Tennessee Ornithological Society and two Audubon Chapters.

The Cumberland Forest Public Hunting Area (PHA), a mostly forested area of 75,000 acres owned by International Paper, adjoins much of the west side of RBWMA. PHAs are managed through a cooperative agreement between land holding companies and TWRA. Forest lands owned by International Paper are managed to provide lumber, paper, clean water, improve wildlife habitats and to create recreational opportunities for the public. In August 2002, TWRA announced its acquisition of this property through a joint effort with The Conservation Fund, Renewable resources Inc., and International Paper.

Stinking Creek, a tributary to the Clear Fork Cumberland River, is listed on the National Rivers Inventory maintained by the National Park Service. It is described in the Inventory as a rural, scenic stream flowing through the unique Cumberland Black geologic formation (NPS 2002). The headwaters of Stinking Creek are about 2 miles east of the project area. None of the proposed mine permit area drains to Stinking Creek.

3.6 Visual Resources

The physical, biological, and cultural features of an area combine to make the visual landscape character both identifiable and unique. Scenic integrity indicates the degree of unity or wholeness of the visual character. Scenic attractiveness is the evaluation of outstanding or unique natural features, scenic variety, seasonal change, and strategic location. Where and how the landscape is viewed will affect the more subjective perceptions of its aesthetic quality and sense of place. Views of a landscape are described in terms of what is seen in foreground, middleground, and background distances. In the foreground, an area within one half mile of the observer, details of objects are easily distinguished in the landscape. In the middleground, normally between a mile and four miles from the observer, objects may be distinguishable but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background, the distant part of the landscape, are not normally discernible unless they are especially large and standing alone. The impressions of an area's visual character can have a significant influence on how it is appreciated, protected, and used.

Landscape character gives a geographical area its visual and cultural image, and consists of the physical, biological, and cultural attributes that makes each landscape identifiable and unique. The general landscape character of the proposed mine permit area is described in the following paragraphs.

The northern portion of the Braden Mountain area is situated between Wesley Gap and Braden Gap. It is heavily wooded, limiting viewsheds to adjacent land areas. Elevations range from about 1950 to 2700 feet at the site of a former lookout tower along the highest ridge. Access to the site is from the south off of Highway 63 at Poteet Gap or from the east

off of Highway 297 at Elk Gap. Both access roads are unimproved; traffic along these roads is limited to seasonal hunters, off-road vehicles, and other recreation users. There are no residents in the immediate mine area; a few occupied houses occur along Highway 297 near Elk Gap.

Narrow abandoned surface mines surround much of the area at about the 2300 foot contour. These mines are mostly revegetated and the highwalls are generally less than 30 feet tall. The remainder of the area is hardwood forest with grass and shrub understory. The elevations along the ridge are comparable or greater in height than surrounding ridges within a four-mile radius. Scenic attractiveness is common. Scenic integrity is moderate.

The southern portion of Braden Mountain is situated between Limestone Ridge to the east and Gunsight Mountain to the west. Elevations range from approximately 2000 to 2650 feet at the highest point on Braden Mountain. Access to the site is via the same unimproved roads used for the northern portion of Braden Mountain.

Narrow, mostly revegetated, abandoned surface mines surround parts of the site at about the 2300 foot contour. Larger, partially revegetated abandoned surface mines occur at about the 2000 foot contour on the southern edge of the site. These larger mines have tall sheer rock highwalls that contrast with the surrounding steep slopes. Views from this area are minimal due to heavy deciduous vegetation. Scenic attractiveness is common. Scenic integrity is moderate.

3.7 Cultural Resources

East Tennessee has been an area of human occupation for the last 12,000 years. Human occupation of the area is generally described in five broad cultural periods: Paleo-Indian (11,000-8,000 BC), Archaic (8000-1600 BC), Woodland (1600 BC-AD 1000), Mississippian (AD 1000-1700), and Historic (AD 1700- to present). Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on flood plains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands. European interactions with Native Americans in this area began in the 17th and 18th centuries associated with the fur trading industry. Euro-American settlement increased in the early 19th century as the Cherokee were forced to give up their land. Campbell County was created by the Tennessee General Assembly in 1806 (Baird et al. 1998). Scott County was created in 1849 (Binnicker 1988).

TVA Cultural Resources Staff has defined the area of potential effect (APE) as the approximately 900 acres associated with the proposed coal mining activity. This APE includes the 664.5 acre proposed mine permit area, as well as areas not included in the mine permit area but bounded by proposed mine features such as sediment basins and access roads.

No archaeological surveys had been previously conducted in the project area. Given the high potential for archaeological resources associated with caves and rockshelters in the Cumberland Plateau area, an archaeological reconnaissance was conducted to determine if any areas within the APE had a potential for archaeological sites. Based on the reconnaissance survey, 400 acres of land were then subjected to Phase I Archaeological surveys to determine if any sites eligible for listing in the National Register of Historic Places (NRHP) were present within the APE. The Phase I Archaeological survey, which

included shovel testing, was conducted in June 2002 (Pietak and Holland 2002). Three isolated finds, none of which are considered potentially eligible for listing on the NRHP, were observed. The survey also identified two rockshelters with a potential for archaeological resources to be present. Phase II testing was conducted at these rockshelters in September of 2002. Archaeological material indicative of brief prehistoric occupation was collected at each of the rockshelters, which were designated as archaeological sites 40CP134 and 40CP135. The limited quantity of material yielded insufficient data to make either rock shelter eligible for listing in the NRHP.

There are 4 historic properties listed on the National Register of Historic Places in Campbell County and 5 in Scott County. None of these properties are located near the project area.

4 ENVIRONMENTAL CONSEQUENCES

The following sections describe the likely environmental consequences resulting from the proposed action. The potential cumulative impacts of the resulting coal mining are described in Final Environmental Impact Statement, Comprehensive Impacts of Permit Decisions Under the Tennessee Federal Program (OSM 1985). In its notice of adoption of this FEIS (55 Federal Register 23338, June 7, 1990), TVA determined that the potential cumulative environmental impacts of coal leasing were adequately assessed. Additional information on potential cumulative hydrologic impacts is presented in the Cumulative Hydrologic Impact Assessments prepared by OSM (OSM 1999) and described below.

Under the No Action Alternative, the leasing and surface mining of coal in the Braden Mountain area would not occur and royalties on the TVA coal would not be paid. The area would continue to be managed as part of Royal Blue Wildlife Management Area by TWRA.

4.1 Vegetation

The proposed action would result in the disturbance of vegetation on about 527 acres of the 664.5 acre mine permit area. The proposed mine permit area is a mixture of recently harvested forest, dominated by saplings and shrubs, abandoned mines in various stages of revegetation ranging from herbaceous and shrub communities to pole-sized forest, and more mature forest dominated by oak-hickory and mixed mesophytic forest types.

Although no plant communities of state, regional, or global significance occur within the mine area, the proposed action would result in long term changes to site vegetation. Vegetation within areas to be mined, as well as fill areas and sediment ponds, would be removed. As the area is reclaimed, ground cover, shrubs, and trees will be replanted. Most of the area will be replanted with a mixture of grasses and legumes such as orchardgrass, annual rye, ladino clover, and red clover.. Portions of the area will be planted with native warm season grasses, in blocks of shrub/tree mixes, or in blocks of deciduous trees dominated by oaks. Following the completion of reclamation activities and bond release, the vegetation on the mine site would be managed by TWRA. In the absence of active management, areas of grass and herbaceous cover would eventually revert to forest.

Several invasive, non-native plant species are already established in RBWMA, partly as a result of previous surface mine reclamation activities. Such species considered to present a severe threat to native plant communities such as sericea lespedeza and autumn olive

would not be used in revegetating the proposed mine. The proposed action would not result in the introduction of any invasive species to RBWMA.

4.2 Wildlife

Under the proposed action, about 527 acres would be modified during construction and operation of the mine. Haul roads would occupy 86 acres; most of the haul roads are existing, and impacts of widening these roads would be minor. Of the remaining 441 acres, about 100 acres are early successional habitats, at least 60 acres are abandoned mine areas with early to mid-successional habitats, and the remainder more mature forest.

Clearing and mining activities would result in some direct mortality of slow-moving animals and the displacement of more mobile species into adjacent habitats as mining activities proceed through the mine area over the course of 7.4 years. This progressive movement of coal removal activities and the subsequent incremental reclamation of the disturbed areas would reduce impacts to local populations of wildlife.

Results of restoration studies performed on reclaimed mines at nearby Brushy and Walnut Mountains (TVA 1981), as well as other studies elsewhere, indicate that wildlife quickly move into reclaimed habitats. Populations of small mammals moved into reclaimed areas within 2 months of planting new vegetation and breeding aggregations of amphibians were noted within settling ponds within the first year. These areas were quickly repopulated by species that favor early successional habitats. Species that favor forested habitats would later move into the reclaimed areas as the postmining vegetation reverts to woodland habitats. The previously approved mine reclamation plan was developed in cooperation with TWRA to assist in meeting their wildlife management goals for the Braden Mountain area. Specific reclamation activities designed to enhance wildlife populations on the reclaimed mine include revegetation of portions of the area with native warm season grasses, retaining sediment basins, planting blocks of mixed trees and shrubs, and planting blocks of hardwood trees. The block hardwood plantings, in addition to accelerating reforestation, would provide connectivity between forested areas downslope from the mine and the hilltop and sideslope areas where coal removal would be by augering.

The proposed action would result in direct impacts to terrestrial animal populations in the project area. However, due to the large amounts of similar habitat adjacent to the project, impacts to terrestrial wildlife in the region would be temporary and insignificant. The project is not expected to result in significant cumulative impacts to terrestrial animal communities, increase populations of exotic or invasive terrestrial animals, or result in significant adverse impacts to migratory birds in the region.

4.3 Endangered and Threatened Species

4.3.1 Plants

One occurrence of a state-listed plant species (goldenseal) was identified on the northern portion of Braden Mountain. At least 116 additional occurrences of this species are known from elsewhere in Tennessee. Therefore, the potential loss of this individual would not significantly impact the viability of this species in Tennessee.

Although areas of marginally suitable habitat were identified for some other state-listed plants reported from the surrounding vicinity, no occurrences of such species (with the exception of the goldenseal mentioned above) were identified during field surveys.

In summary, the proposed action would not result in significant impacts to state-listed plant species, and no federally listed plants would be affected.

4.3.2 Terrestrial Animals

Under the proposed, action TVA would enter a lease agreement with a coal company that would result in surface mining of coal on Braden Mountain. This would result in the modification of about 527 acres of forested and early successional habitats over a 7.4 year period. Of the 22 protected species of terrestrial animals reported from Scott and Campbell Counties, 16 are known to exist or potentially exist on the project site.

The red-cockaded woodpecker, Swainson's warbler, Bewick's wren, hellbender, and Black Mountain dusky salamander were removed from consideration due to the lack of or the limited presence of suitable habitat for these species on the site. Potential hibernating sites for the Indiana bat and the gray bat are provided by abandoned mine portals in the mine permit area. One of these portals was inspected in January 1999 and determined to be unsuitable for use by hibernating Indiana bats or gray bats. No evidence of summer use by gray bats was observed during inspections in the summer of 2002. The only activities proposed in the immediate vicinity of a second portal on the northwest slope of the southern portion of Braden Mountain are sediment basin and access road construction. These activities would not significantly disturb the portal. A third portal, on the east slope of the northern portion of Braden Mountain has a small, mostly collapsed opening and does not appear suitable for use by the Indiana bat or gray bat.

The remaining 16 species are known to exist or potentially exist in early successional and forested habitats in the project area. Construction and operation of the mine could affect individual specimens of most of these species. However, impacts to the species as a whole are expected to be temporary as most of these species would disperse into nearby similar habitats.

Once reclamation activities begin, species that breed or forage in early successional habitats such as four-toed salamander, golden-winged warbler, barn owl, big-eared and small-footed bats, southeastern shrew, hairy-tailed mole, and bog lemming would re-colonize the area. Local populations of some of these species, particularly the golden-winged warbler, would increase, and the reclaimed mine would provide suitable habitat for this warbler for many years. Forest dwelling species would experience a short-term reduction in habitat and local populations of some of these species would be slightly reduced. Up to 69 pairs of cerulean warblers would be affected within the area of surface mining and fills; this number represents a small fraction of the population of this species in the RBWMA as well as in the Cumberland Mountains. Portions of the mined area would be reforested during reclamation and these areas would provide suitable habitat for many forest-dwelling species. Due to the large amounts of suitable habitats nearby, impacts to these species would be temporary and insignificant and their population viability on RBWMA would not be affected.

During the review of the OSM Environmental Review of the Gatliff Coal permit, USFWS, TVA, and TWRA determined that there would be no significant impacts to any federally listed species if certain commitments were followed. These commitments are listed in the FONSI issued by TVA in 1999 (TVA 1999) and incorporated into the currently proposed action. They are designed to establish specific reclamation activities to protect the

endangered Indiana bat and other species of wildlife. With the implementation of these measures, the proposed action is not likely to adversely effect threatened and endangered terrestrial animals.

4.3.3 Aquatic Animals

Of the nine endangered, threatened, or otherwise sensitive aquatic species potentially occurring in the project area, only the blackside dace, the arrow darter, and the emerald darter are present in streams potentially impacted by mining Braden Mountain. These species are reported from Terry Creek near its confluence with Elk Fork Creek, and from the Straight Fork system. The Terry Creek headwaters consist of three streams whose surface water is supplied by drainage from the Braden Mountain site; Stillhouse Branch, Frogpond Hollow, and Hudson Branch. Straight Fork Creek is supplied by several streams that drain the Braden Mountain area, including Jake Branch, Cross Branch, and Straight Fork Creek.

Potential impacts to these three streams resulting from the proposed action are discussed in the Cumulative Hydrologic Impact Assessment (CHIA) prepared by Gatliff Coal Company in the previous review of this project. These potential impacts are discussed in CHIA No. 101, Cumulative Impact Area (CIA) No. 10, Subarea No. 6B (Elk Fork Creek system) and CHIA No. 84, CIA No. 8, Subarea No. 6B (Straight Fork). This analysis considers all existing and anticipated mining operations and addresses potential cumulative hydrologic impacts to CIA 10, Subarea 6B (Elk Fork Creek), and CIA No. 8, Subarea 6B (Straight Fork Creek).

This assessment concludes that while there is slight potential for acid/toxic drainage, and increased sediment loads into Terry Creek, Stillhouse Branch, Frogpond Hollow, and Hudson Branch in the Elk Fork system, and Jake Branch, Cross Branch, and Straight Fork in the Straight Fork system, the effects would be minimized by measures to be implemented during active mining, and during reclamation of the site. Surface-water monitoring of these streams, and of the settling basins above these streams, would be conducted in accordance with NPDES permit requirements to ensure that water quality impacts to receiving streams are minimized.

This hydrological analysis indicates that water quality in these streams should remain within acceptable limits and would not significantly exceed conditions favored by these species. Therefore, this proposed mining activity would likely result in only short-term, insignificant impacts to aquatic life in Terry Creek and Straight Fork, including blackside dace, arrow darter, and emerald darter.

Construction of the haul roads would have potential to impact populations of blackside dace, arrow darter, and emerald darter in the Straight Fork system. These potential impacts would result primarily from run-off of silt generated by road construction and maintenance activities.

Construction and maintenance of the haul road would be performed in accordance with appropriate Best Management Practices. Use of measures to control run-off from the haul road, and to minimize ground disturbance during construction would likely result in only insignificant impacts to blackside dace, arrow darter, and emerald darter in Straight Fork.

4.4 Surface Water, Groundwater, and Aquatic Ecology

Potential impacts to surface water and aquatic ecology resulting from the proposed mining activities include increased sediment in surface runoff, acid/toxic drainage, altered flow regimes, and impacts to streams from construction of hollow fills. Potential impacts to groundwater include changes in availability and flow regimes, and changes in water quality.

Runoff from the proposed mine site would drain into three watersheds (Straight Fork, Elk Fork, and Buffalo Creek) and runoff from a part of the proposed haul roads would drain into a fourth watershed (Cove Creek). OSM (1999) has prepared Cumulative Hydrologic Impact Assessments (CHIAs) for these four watersheds. No surface water users or groundwater users would be affected in any of the four watersheds.

Measures incorporated into the mine plan to minimize hydrologic impacts include use of hay bales and filter fabric fence, installation of sediment basins with controlled discharges, periodic sampling of water in sediment basins and chemical treatment as necessary. Although the majority of the strata to be disturbed by mining exhibit a positive net acid base accounting (i.e., have sufficient buffering capacity to prevent acid production), the coal seams are potentially acid producing. The proposed mine plan includes a hydrologic reclamation plan and a toxic material handling plan. Mined coal would be promptly removed from the site and overburden would be blended when backfilled to minimize potential acidic problems. Sediment in basins would be sampled prior to removal and treated according to the mine plan. Sediment basins would be retained following reclamation at the discretion of TWRA.

Groundwater quality in the proposed mine area is highly variable and iron and manganese concentrations sometimes exceed EPA standards for public water systems. Any impacts to groundwater quality would be localized and not affect groundwater users.

The CHIAs show that impacts to surface water would be insignificant. Within each of the four watersheds, there would be a small increase in sediment loading during mining. Following mining, the sediment yield load value would decrease to levels similar to or less than pre-mining values. pH values would be unchanged or slightly decrease; the greatest change would occur in the Elk Fork watershed, where the minimum anticipated pH would be 7.3, a near-neutral value within acceptable EPA limits for domestic water supplies and freshwater aquatic life. Increases in total dissolved solids, dissolved iron, and dissolved manganese levels would be small and anticipated concentrations would remain within EPA standards in the Elk Fork and Buffalo Creek watersheds.

Total dissolved solids and dissolved manganese concentrations in the Straight Fork watershed presently exceed EPA standards under flow conditions; these problems are caused in large part by drainage from old mine openings in the Big Mary coal seam. The proposed mining, which includes reclamation of orphan mine areas, would not result in further degradation of Straight Fork.

A few short segments of intermittent streams and wet weather conveyances, as well as a few small ponds, would be directly impacted by mining activities. Stream channels would be restored during reclamation, and no long-term changes in runoff are anticipated. Sediment basins would replace habitat currently present in ponds. Overall impacts to aquatic ecology would be insignificant.

4.5 Managed Areas and Ecologically Significant Sites

The proposed action would result in the operation of a coal surface mine within the Royal Blue Wildlife Management Area. This would affect wildlife habitat and recreational use, including hunting and off-road vehicle use, within the proposed mine permit area. The proposed mine permit area comprises a small portion of RBWMA (less than 2%) and the revegetation plan was developed with the assistance of TWRA. The main roads into the area from Highway 63 at Poteet Gap and from Highway 297 at Elk Gap would remain open to the public. The Gunsight Mountain road, which passes through the southern portion of the Braden Mountain area, may be closed during active mining operations. Impacts to the RBWMA are expected to be temporary and insignificant.

No impacts to the Cumberland Forest Public Hunting Area, or to Stinking Creek, listed on the National Rivers Inventory, are anticipated. Impacts to the Southern Cumberland Mountains Important Bird Area, which includes RBWMA and other nearby areas, are expected to be temporary and insignificant.

4.6 Visual Resources

Visual consequences are examined in terms of visual changes between the existing landscape and proposed actions, sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes. Scenic integrity indicates the degree of intactness or wholeness of the landscape character. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty, and the aesthetic sense of place. The foreground, middleground, and background viewing distances were previously described in the affected environment section.

Site preparation and initial mining activities would adversely impact the visual landscape character of the proposed mine permit area by removing forest cover, modifying landforms, and increasing truck traffic along local access roads. Some fill areas would have a series of stair-stepped plateaus with somewhat gentler slopes than presently exist. These features would increase adverse visual contrast, while reducing unity, coherence, and harmony in the landscape during the initial construction period. Scenic integrity would be lower. Most of these visual impacts would lessen over time as the area is revegetated.

Some proposed mining operations would be visible to recreational users of the Braden Mountain and Limestone Ridge areas of RBWMA. Portions of the mine area may also be briefly visible to motorists on Highways 63 and 297, as well as Interstate 75. The mine area would be in the middleground or background of views from these roads, and visual details would be weak. Views from these highways already include highwalls of unreclaimed mines, as well as elements such as communication towers and, on Interstate 75, billboards. Overall visual impacts would be insignificant and mostly short-term.

4.7 Cultural Resources

A Phase I Cultural Resource survey of the APE identified two rockshelters with a potential to contain archaeological sites. Further investigations of these areas were conducted and two archaeological sites were identified (40CP134 and 40CP135). Material from these sites was considered insignificant and neither site is recommended as potentially eligible for the NRHP. TVA has determined that the proposed project would have no effect on any historic properties on or eligible for NRHP listing. A letter of TVA's findings and determinations was

sent to the Tennessee State Historic Preservation Officer on October 18, 2002. Similar letters were sent to the Eastern Band of the Cherokee Indians on October 23, 2002.

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5.2 Preparers

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Appendix 1

Endangered, threatened, or otherwise listed plant species known to occur in Campbell and Scott Counties, Tennessee.

Common name	Scientific name	Federal status	State status
Alabama grapefern	<i>Botrychium jenmanii</i>		Threatened
Alder-leaf buckthorn	<i>Rhamnus alnifolia</i>		Endangered
American barberry	<i>Berberis canadensis</i>		Special Concern
Barbara buttons*	<i>Marshallia grandiflora</i>		Endangered
Bristle fern	<i>Trichomanes boschianum</i>		Threatened
Canada lily	<i>Lilium canadense</i>		Threatened
Capillary beakrush	<i>Rhynchospora capillacea</i>		Endangered-P ¹
Climbing fumatory	<i>Adlumia fungosa</i>		Threatened
Cumberland rosemary	<i>Conradina verticillata</i>	Threatened	Threatened
Cumberland sandwort	<i>Arenaria cumberlandensis</i>	Endangered	Endangered
False foxglove*	<i>Aureolaria patula</i>		Threatened
Ginseng	<i>Panax quinquefolius</i>		Special Concern- CE
Goldenseal	<i>Hydrastis canadensis</i>		Special Concern- CE ²
Green-and-gold	<i>Chrysogonum virginianum</i>		Threatened
Kentucky rosin-weed	<i>Silphium wasiotense</i>		Endangered
Lady-slipper*	<i>Cypripedium kentuckiense</i>		Endangered
Meehan mint	<i>Meehania cordata</i>		Threatened
Northern white cedar	<i>Thuja occidentalis</i>		Special Concern
Ozark bunchflower	<i>Melanthium woodii</i>		Endangered
Pale corydalis	<i>Corydalis sempervirens</i>		Endangered
Panic-grass*	<i>Panicum ensifolium</i>		Special Concern
Pink lady-slipper	<i>Cypripedium acaule</i>		Endangered-CE ³
Pondweed*	<i>Potamogeton tennesseensis</i>		Threatened
Rockcastle aster	<i>Aster saxicastellii</i>		Endangered
Roundleaf bitter-cress	<i>Cardamine rotundifolia</i>		Special Concern
Roundleaf fameflower	<i>Talinum teretifolium</i>		Threatened
Sandreed grass*	<i>Calamovilfa arcuata</i>		Endangered
Smoothleaf honeysuckle	<i>Lonicera dioica</i>		Special Concern
Southern rein orchid	<i>Platanthera flava</i> var <i>flava</i>		Special Concern
Spike-rush*	<i>Eleocharis intermedia</i>		Special Concern
Spotted coral-root	<i>Corallorhiza maculata</i>		Threatened
Stonecrop*	<i>Sedum nevii</i>		Endangered
Sullivantia	<i>Sullivantia sullivantii</i>		Endangered
Sweet-fern	<i>Comptonia peregrina</i>		Endangered
Tawny cotton-grass	<i>Eriophorum virginicum</i>		Threatened
Virginia spiraea	<i>Spiraea virginiana</i>	Threatened	Endangered
White snakeroot*	<i>Ageratina luciae-brauniae</i>		Threatened
Wild ginger*	<i>Hexastylis contracta</i>		Special Concern
Witch-alder*	<i>Fothergilla major</i>		Threatened
Wood lily	<i>Lilium philadelphicum</i>		Endangered

- *The common name listed is routinely applied to more than one member of this genus.
- ¹ Endangered-P – endangered, potentially extirpated.
- ² Special Concern-CE = special concern due to commercial exploitation.
- ³ Endangered-CE = endangered due to commercial exploitation.